Partial pancreatectomy and splenectomy using a bipolar vessel sealing device in a cat with an anaplastic pancreatic carcinoma

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Partial pancreatectomy and splenectomy using a bipolar vessel sealing device in a cat with an anaplastic pancreatic carcinoma

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Summary

A fourteen year old domestic shorthair cat was presented because of vomiting, anorexia and an abdominal mass. A diagnosis could not be made pre operative and in surgery the mass was assigned to the gastric part of the pancreas. A partial pancreatectomy and splenectomy was performed using a Ligasure® vessel sealing device. No surgery related complications occurred. Histological examination revealed an anaplastic carcinoma of the pancreas. The cat was in a good clinical condition 14 days after surgery. After two months the private vet euthanized the cat with the suspicion of a pathologic fracture. Review of the xray suggested a bone tumor but histology was not performed to confirm that. Findings in this case indicated that pancreatic carcinoma in cats has a poor prognosis a previously described, but pancreatectomy can be performed as known in dogs and humans using a bipolar vessel sealing device as a safer and faster alternative to standard surgical techniques.

Keywords: cat, vessel sealing device, partial pancreatectomy, splenectomy, anaplastic pancreatic carcinoma

Partielle Pankrektomie und Splenektomie mittels Ligasure bei der Katze mit einem pankreatischen anaplastischen Karzinom

Zusammenfassung

Im Notdienst wurde eine 14 jährige europäisch Kurzhaarkatze mit vorberichtlichem Erbrechen und Anorexie vorgestellt. In der klinischen Untersuchung und im Ultraschall wurde eine abdominale Masse palpiert bzw. dargestellt, die präoperativ nicht näher spezifiziert werden konnte und intraoperativ dem Pankreas zugeordnet wurde. Eine partielle Pankrektomie mittels einem bipolaren Gefässversiegelungsgerät (Ligasure ®) verlief ohne Komplikationen und die Katze zeigte ein gutes Allgemeinbefinden 14 Tage nach der Operation. Histologisch konnte ein Pankreaskarzinom diagnostiziert werden. Weitere 2 Monate später wurde die Katze mit Verdacht auf eine pathologische Fraktur eingeschläfert, ohne dass dies histologisch untersucht wurde. Dieser Fallbericht unterstreicht die schlechte Prognose von Pankreaskarzinomen bei Katzen und zeigt die partielle Pankrektomie mittels Ligasure® als schnelle und sichere Alternative zu konventionellen Techniken bei der Katze.

Introduction

Cancer of the exocrine pancreas is very rare in dogs and uncommon in cats (Davenport, 1985). Most pancreas cancer in cats are adenocarcinomas of ductular or acinar origin (Withrow, 2007). The prognosis for these animals is considered poor and metastases, usually to liver, lymph nodes or the lungs, are often widespread at the time of diagnosis (Bennett, 1997; Thomson, 2003). The use of bipolar electrosurgical vessel sealing devices is becoming more and more common both in human and veterinary medicine for a variety of surgical procedures. These include partial pancreatectomy in dogs and humans (Hartwig et al., 2010; Wouters et al., 2011), laparoscopic ovariectomy in dogs and horses (Hand et al., 2002; Mayhew and Brown, 2007; Dupré et al., 2009), splenectomy in dogs (River and Monnet, 2010), resection of elongated soft palate (Bredecka et al., 2008) and partial hepatectomy in dogs (Risselada et al., 2010). To the authors' knowledge, their use in cats has thus far not been described. The present report documents the successful removal of a pancreatic carcinoma with partial pancreatectomy and total splenectomy using a bipolar vessel sealing device in a cat.

Clinical examination and diagnosis

A 14-year-old female spayed domestic shorthair cat was referred to the veterinary hospital with a two-day history of vomiting, apathy and anorexia. The cat was diagnosed with diabetes mellitus four years prior to presentation and had been in remission until one month ago when insulin therapy was reinstituted.

The cat was in a lethargic condition and the abdominal palpation revealed discomfort and a cranial abdominal mass of approximately 4cm diameter. The remaining was unremarkable. A complete blood count, serum biochemistry,

fructosamin and urinalysis revealed leukopenia (leukocytes 3.8 x10^9/l; reference range 4.6-12.8 x10^9/l), hyperglycemia (glucose 25.6 mmol/l; RR 4.0-9.0 mmol/l), hypoproteinemia (total protein 58 g/l; RR 64-80 g/l), a mildly elevated serum lipase (116 U/l; RR 8-26 U/l), elevated serum fructosamin (481 µmol/l; RR 202-299 µmol/l), and glucosuria. Serum fructosamin was elevated. Abdominal ultrasound revealed a hypoechoic space-occupying mass (3.5cm x 3cm) in contact to the hilus of the spleen and moderately enlarged lymph nodes in the iliocaecal region (Fig 1). The liver appeared hypoechoic. Cytology of the mass and the lymph nodes, collected by ultrasound-guided fine-needle aspiration were not diagnostic and exploratory surgery was performed.

Surgical Procedure

A standard midline exploratory coeliotomy was performed and a mass close to the hilus of the spleen, originating from the left pancreatic lobe, was encountered. A partial pancreatectomy including removal of the spleen was accomplished using a bipolar vessel sealing device (Ligasure® 5mm controlled by ForceTriad® Energy Platform, Covidien, Bolder, CO, USA). Vascularisation of the remaining pancreas was spared (Fig. 2) and a margin to the mass of approximately 3 cm was respected. The Ligasure® was applied without any previous dissection by sealing the short gastric vessels, the splenic artery and vein and the gastroepiploic artery and vein including partial removal of the omentum. Biopsies were taken from gastric and iliocaecal lymph nodes and the liver.

The abdomen was subsequently lavaged with warmed lactated Ringer's solution before routine abdominal closure following a total surgical time of 65 minutes. Histological examination of the resected pancreatic segment revealed a poorly-differentiated carcinoma that was completely excised with clean margins. Hepatic and lymph node biopsies did not show any evidence of metastasis.

Recovery and further examination

The cat made a satisfactory recovery from the surgery and was discharged 7 days postoperatively. Follow-up examination performed 2 weeks after surgery was unremarkable and no evidence of abdominal effusion was found either on palpation or ultrasonographically. Further bloodwork to assure diabetes control and chemotherapy using gemcitabine (cytostatic cytidine analogue leading to apoptosis) were declined by the owner. Two months after surgery, the cat was presented to the referring veterinarian with acute hindlimb lameness. Radiographs of the left femur revealed a supracondylar short oblique simple femur fracture with a moth-eaten appearance of the bone. Thoracic laterolateral and ventrodorsal radiographs did not show evidence of pulmonary metastasis at that time. A pathologic fracture was suspected and the cat was euthanized at the owner's request. Post-mortem examination was declined by the owner.

Discussion

The presented case documents the successful removal of a pancreatic mass and the spleen using a bipolar vessel sealing device in a cat. No surgical complications were encountered and the cat recovered uneventfully from surgery. It has been shown in pigs that postoperative markers for pancreatitis were lower using the bipolar vessel sealing device (Hartwig et al., 2010). The seal of the pancreatic tissue, the less handling necessary for separation of the pancreatic tissue, the reduced surgical time and the decreased thermal damage compared to conventional devices results in less risk of postoperative complications (Kennedy et al., 1999; Stranahan et al., 1999; Goldstein et al., 2002; Wouters et al., 2011).

Surgical alternatives to the use of this device include partial pancreatectomy performed by suture fracture technique or dissection ligation (Allen et al.,1989). Complete removal of the spleen was performed because adhesions between the tumour and the spleen were present. Preservation of the spleen was considered impossible without risking damage of the splenic artery and vein and was considered necessary to achieve clean margins for the resection of the tumor. Little is known about the outcome in splenectomies performed in cats. One study found preoperative weight loss to be associated with outcome (3 vs 293 days median survival time) in feline patients with splenectomy. Even though all of these had splenic masses, mostly Mastocytoma, and survival is most likely to be associated with the splenic mass rather than with the splenectomy itself. In the presented case the primary tumor was pancreatic and the splnectomy was performed because of adhesions so direct comparison may be difficult (Gordonet al., 2010).

Two to three separated sealing procedures next to each other for artery and vein are recommended for splenectomy in dogs weighing up to 66 kg using the Ligasure® to achieve a secure seal (Rivier and Monnet, 2010). In the cat as reported here, only one seal and dissecting step was performed without evidence of intra- or postoperative hemorrhage. It was considered safe and time saving. However, general recommendations for splenectomy in cats using this device cannot be made based on a single case. In humans, recommendations regarding the use of Ligasure® for splenectomy do not include the separation of vein and artery and multiple sealing steps (Romano et al., 2002; Romano et al., 2007).

Considering the smaller size of the patient, the total operative time of 65 minutes in the present report is comparable to a mean of 78 minutes reported for splenectomies in dogs (Rivier and Monnet, 2010) and 107 minutes for partial pancreatectomy in dogs (Wouters et al., 2011). In the presented case the decrease

in surgery time might also be due to the direct seal of artery and vein and the dissection to separate these two vessels. In humans, decreased operative time is reported with the use of Ligasure over stapling devices for splenectomy without a seal of artery and vein (Romano et al., 2007).

The bipolar vessel sealing device used seals vessels with a different technique than the commonly used conventional bipolar systems using lower voltage and higher currents. Compression of the jaws and the heat generated induce fusion of collagen and elastin in vessel walls and subsequent tissue reformation with creation of a permanent seal zone (Kennedy et al., 1999; Heniford et al., 2001; Shamiyeh et al., 2002). The tissue damage is limited because the heat created reaches only 50-80°C compared to up to 600°C with the electric scalpel. This results in reduced healing time and lowers the risk for scar tissue formation (Stranahan et al., 1999). The collateral spread of 0.5-2 mm is achieved by using tissue impedance measurement, reduced fusing cycle time and tissue desiccation (Kennedy et al.,1999; Stranahan et al., 1999; Heniford et al., 2001; Goldstein et al., 2002). The seal created resists three times the normal blood pressure and arteries up to 7mm in diameter can be securely sealed in humans (Kennedy et al., 1999; Shamiyeh et al., 2002). Another advantage is the feedback control of the Ligasure® that indicates a complete seal of the vessel by a tone. This is determined by measuring the impedance of the sealed tissue. In contrast, an incomplete seal is documented by an alarm tone giving the surgeon the opportunity to apply the jaws properly and avoiding severe bleeding due to an incomplete seal. The use of Ligasure® has improved several procedures in human medicine by creating faster healing time, shorter hospitalisation periods, less pain and overall lower complication rates (Chiappa et al., 2008; Remzi et al., 2008; Kovacs et al., 2009). In some veterinary procedures, it has

also been stated to result in faster operating time, less morbidity and shorter hospitalisation time (Wouters et al., 2011; Rivier and Monnet, 2010).

Next to the advantages listed above the Ligasure® is an expensive investment. The control unit is offered for approximately 30.000 SFr and each instrument is another 500-600 SFr. The instruments are sold as single use devices but they can be reused after gas sterilization several times.

The use of the Ligasure® appears as a safe and quick technique for splenectomy in cats. As only one case was presented a prospective comparative study is warranted to make conclusions generally applicable and to further evaluate the need for separately sealing artery and vein because this report and the human literature are contradictionary to the veterinary literature.

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Figures

Figure 1: Abdominal ultrasound showing the mass adjacent to the otherwise normal appearing spleen.

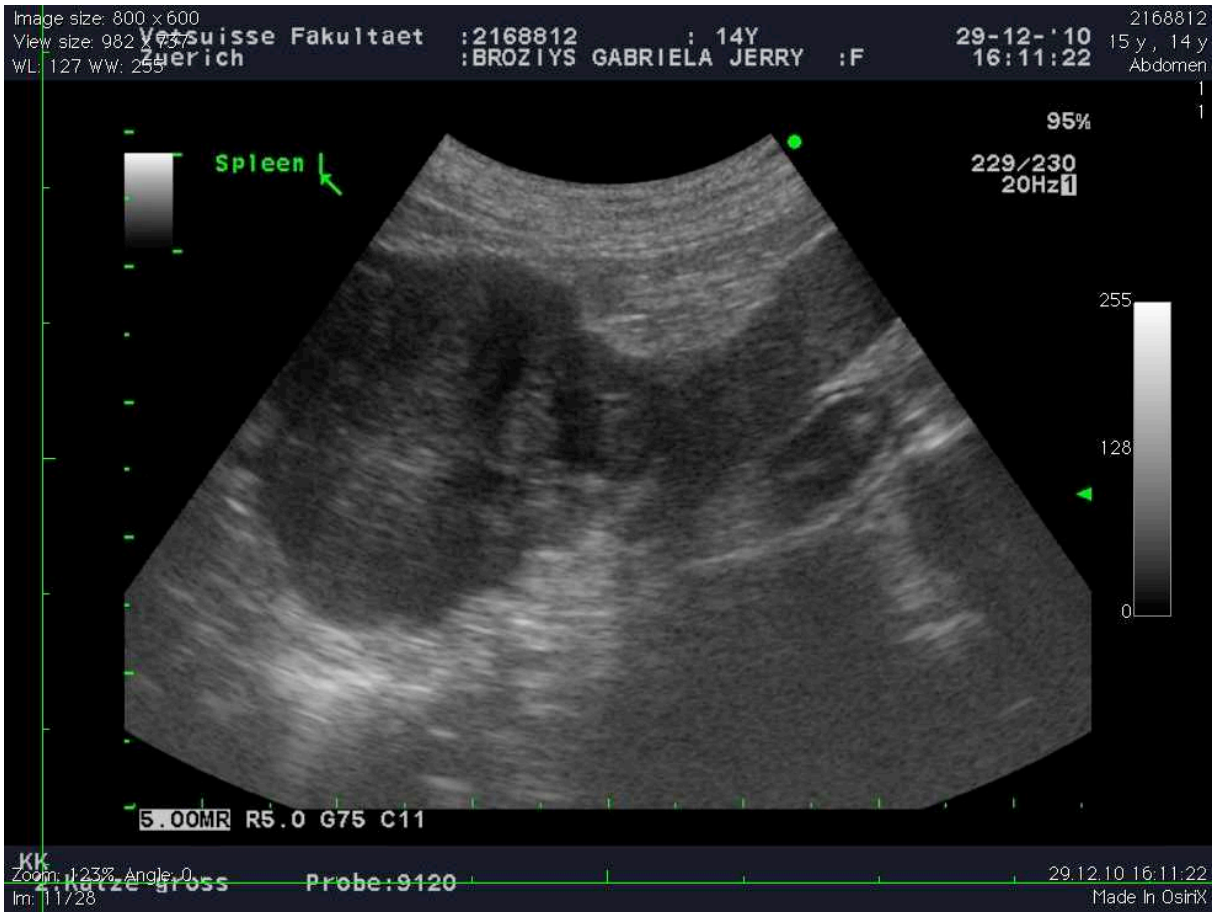
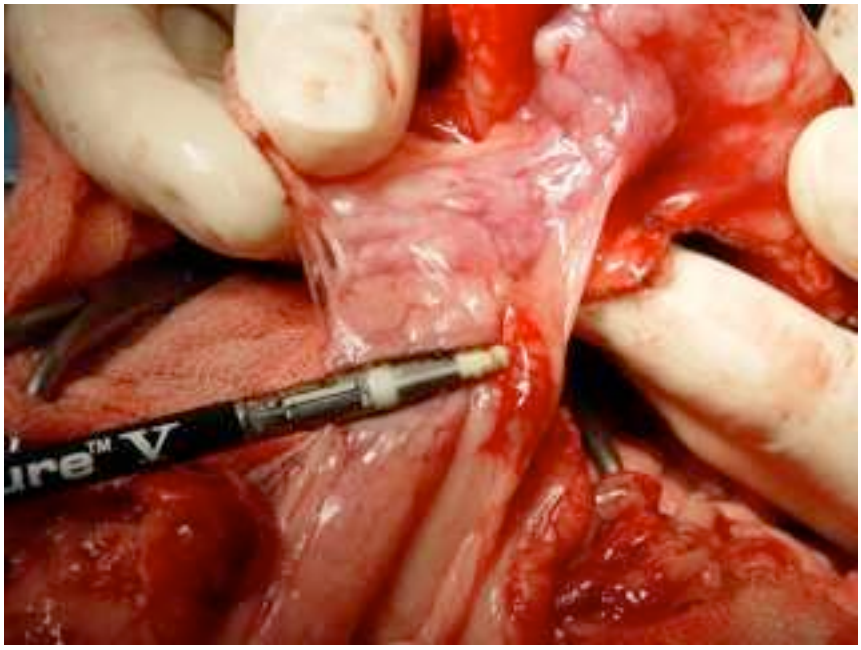


Figure 2: Dissection of the pancreas with the Ligasure® bipolar vessel sealing device.



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